CAIT
Center for Advanced Infrastructure & Transportation
Rutgers, The State University of New Jersey

QUARTERLY PROGRESS REPORT

Project Title:	Investigation into Modified Asphalt Binders for Improved Pavement Performance
RFP NUMBER:	NJDOT RESEARCH PROJECT MANAGER: Mr. Anthony Chmiel
TASK ORDER NUMBER/Study Number: Task Order No. 80 / 4-23908	PRINCIPAL INVESTIGATOR: Dr. Ali Maher
Study Start Date: 02/01/2000 Study End Date: 01/31/2003	Period Covered: 3rd Quarter 2003

Task	% of Total	% of Task this quarter	% of Task to date	% of Total Complete
Literature Search	10%	0%	100%	10%
1. Material Collection	5%	0%	100%	5%
2. Laboratory Testing	50%	0%	100%	50%
3. Calibration	15%	0%	100%	15%
4. Reporting	20%	5%	100%	20%
Final Report				
TOTAL	100%			100%

1. Progress this quarter by task:
   A. A final report was generated and will be submitted to the NJDOT for review. Some of the final conclusion of the study are as follows:
   1. Both simulative-type and fundamental type testing are needed to characterize modified asphalt binders when using a direct add-in type of material. The direct add-in asphalt modifier is defined as a modifier that can be added directly to a pre-determined asphalt mix. The fundamental type testing, such as the Simple Shear and Frequency Sweep, correlated well to the binder testing and thus can be used to provide an analysis of the added performance of an asphalt modifier. However, the simulative testing, such as the Asphalt Pavement Analyzer and the Repeated Shear, are heavily influenced by the overall hot mix itself. Therefore, if the asphalt modifier in question does not allow for itself to be utilized as an add-in material, like the Carbon Black was in this study, this type of testing will indicated such.
   2. The Long Term Oven Aging (LTOA) procedures used to simulate field aging of samples may increase the potential of the HMA to develop micro-cracking in the mastic. The micro-cracking can be explained by evaluating the data and comparing the induced strains per test. The Frequency Sweep, which applies the lowest amount of sample strain, was affected the greatest. It appears that the closure of the micro-cracking was incorporated in the applied strain, therefore reducing the overall applied stress. If the applied stress is reduced, while applying the same strain, the material has the perception of losing stiffness when compared un-aged samples. This was very evident in the higher test temperatures of the Frequency Sweep test. However, both the Simple Shear and the Repeated Shear did not exhibit this reduction in stiffness at higher test temperatures. This was either due to the larger strains associated with the tests, or that the tests are conducted in a stress-controlled environment, not a strain controlled like the Frequency Sweep.
   3. Two different test procedures were developed to evaluate and rank asphalt binder modifiers. These procedures were based on the statistical analysis of 14 different tests/test parameters. Two procedures were developed to allow the user to conduct either a quick evaluation (only recommended if NJDOT has previous working history with the additive) or a more comprehensive procedure that incorporates an aging analysis. These two procedures utilize both simulative and fundamental type test methods.

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2. Proposed activities for next quarter by task:
   A. Once the report is reviewed by the NJDOT, the proper corrections will be made and again returned to the NJDOT for final comments.

3. List of deliverables provided in this quarter by task (product date)
   N.A.

4. Progress on Implementation and Training Activities
   N.A.

5. Problems/Proposed Solutions
   N.A.

6. Budget Summary*

Total Project Budget(# of years)	3 Years	$213,544.00
Total Project Expenditure to date		$212,765
% of Total Project Budget Expended		100%
Task Order Number/Study Number:		80 / 4-23908
Current Task Order Budget (# of years)	Years 1, 2, and 3	$213,544.00
Actual Expenditure to date against current task order		$212,765
% of current task order budget expended		100%

* These are approximate expended amounts for the project; these estimates are for reference only and should not be used for official accounting purposes. For a more accurate project accounting please review the quarterly invoice for this project.